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The American Biology Teacher

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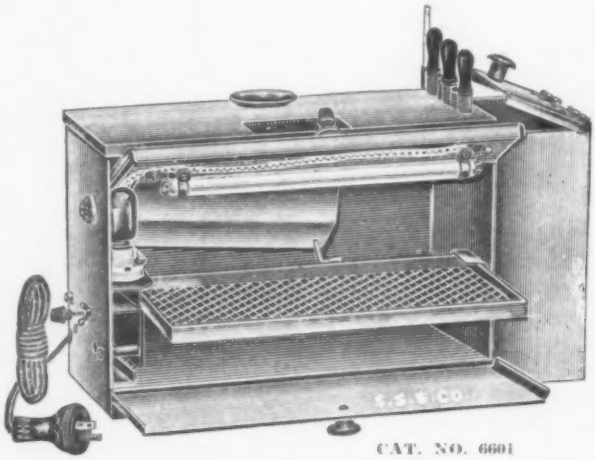

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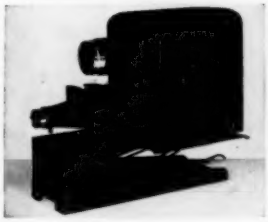

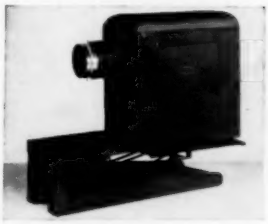

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Some Aspects of High School Biology

JOHN BREUKELMAN
Kansas State Teachers College of Emporia

High school biology is characterized by an almost complete lack of standardization, in both aims and content. The aims are constant matters of controversy, among both biologists and educators. In content, no two textbooks or manuals are alike. Ask biology teachers what ought to be included and what left out, and you get almost as many different answers as answering teachers. Colleges do not make special provision for students who have studied biology in high school, as they do in the case of physics, chemistry, algebra, and some other subjects taught regularly in both high school and college.

Although there are many reasons for this diversity, four are outstanding. First, biology is a subject that must be adapted in a large measure to the locality in which it is taught. Second, its course organization has changed a great deal—it has been taught as botany, zoology, nature study, natural history, anatomy, physiology, hygiene, health lessons, etc. Third, since the general course in biology is relatively new in high schools it has not been subjected to the standardizing influences of the stricter college entrance requirements of the past. Fourth, there has been very little organization of biology teachers into groups for discussion of common problems.

High school biology is often nothing more than dilute college biology. For the poorly prepared teacher, the only, or at least the easiest way out, is simply to pass on as much as possible of what was received in college. In the days when biology was largely morphology and taxonomy, this condition was inevitable. Now it should not exist, unless the aims of high school and college biology are the same, or unless the sole objective of high school biology is college entrance.

Most of the older aims of high school biology can no longer be defended. The "disciplinary value" of science has gone; we no longer believe in "training

the mind." Fostering religious ideals is not now considered a goal of biology teaching; religion may of course make use of biology as it sees fit. College entrance is not an important aim of high school biology, except in occasional specialized courses. And as for the "scientific attitude," we should strive not to develop but to maintain it, *i.e.*, to keep active the attitude of sincere, youthful curiosity, which is the most valuable thing in science. (Recognized even by the *Saturday Evening Post*.[1])

What follows is an attempt to state my own personal views, formed partly from the literature on the subject, but more largely from my own experiences in teaching biology in both high school and college, from visits and correspondence with my former students and others who are now in the high school teaching field, and from comments made by my students concerning their own high school biology courses.

High school biology is not for the specialist. With the exception of the general surveys, college biology courses train biologists or persons who plan to use biology professionally; high school biology courses have the more important job of training citizens. Kinsey[2] makes the apt comment "Don't forget that you are always training average citizens and only rarely a future biologist. Keep the viewpoint of the average man, whose evaluation of science must depend upon his understanding of its relations to the other affairs of life. Said average citizen is not ready for the world of the compound microscope—where things are unnaturally large, and squeezed into two dimensions, and turned upside down—until he has learned all he may readily learn by examining the world with his own eyes. To the beginning student, Spirogyra under the microscope cannot begin to be as important as the green scum in the stagnant overflow of the meadow stream."

In my opinion a course in high school biology should be so set up and taught as to try to do at least three distinct things; first, show the pupil the human-welfare side of biological science, second, develop interests which may be continued after school years, and third, encourage the attitude of objectivity.

First: John Citizen is interested in those phases of biology that make for greater every-day comfort and security. He has a right to demand that high school biology acquaint him with the economic importance of plants and animals, control of disease and parasites, heredity and eugenics, sex and reproduction, application to agriculture, conservation of wild life, and the like. The phases of biology that are of general practical interest should make up a large part of the actual content matter of the course.

Second: Many aspects of biology can easily become life-long spare time activities. Under this heading come specimen collecting, plant and animal raising, bird study, feeding, housing and banding, aquarium and terrarium activities, nature photography and the like. It is evident that we are going to be faced with the problem of more and more time to use for something else than the business of making a living; it is trite to say that we might use it for living. But living abundantly requires breadth of interests. Call "unemployment" "leisure" to get the implications of the present social situation as regards the need for lasting avocational interests. That

[1] Editorial, "Curiosity," *Sat. Eve. Post*, Vol. 211, No. 30, p. 22, Jan. 21, 1939.

[2] Kinsey, Alfred C., *Field and Laboratory Manual in Biology*, p. XIII, J. B. Lippincott Company, Philadelphia, 1927.

teacher who makes biology so alive as to lead to some hobbies among his pupils is making a fundamental contribution to citizenship.

Third: The attitude of objectivity, so sorely needed in these confused times, can be taught young people, by precept and example, more easily in science courses than anywhere else in the high school; and more significantly in biology than in physical science, because the pupil himself is a part of the subject matter of biology. So the biology teacher has a well-nigh sacred duty to perform in keeping facts facts and opinions opinions, and in guiding his pupils so that they will see for themselves the distinctions between facts and opinions. One of the most important things people in our kind of world should learn early, and one that many people never learn, is that one's opinion concerning a situation has no bearing on the situation. It is easy and natural in biology to get the pupil into the notion that his opinion concerning bacteria makes no difference to the bacteria, that his opinion on the effect of light on the skin does not modify the effect of light on the skin, that his opinion that hawks eat chickens, has no bearing on what hawks eat. Herein lies one of the greatest opportunities and at the same time one of the greatest obligations of high school biology. The pupil lives in a world of opinions, beliefs, snap judgments, prejudices, propaganda and deliberate misstatement. Somewhere he must learn not to take too many intellectual wooden nickels. If he can be helped to form even one completely sound scientific conclusion and to realize that he has done so, he may always be a saner citizen. I have purposely overemphasized this point, for it is so often completely neglected.

High school biology should stay out of such abstruse phases of organic life as the physico-chemical nature of protoplasm or the details of chromosome behavior; such things are not in the range of interest of the average citizen, and there is always the danger of over-simplification. Details of classification and taxonomy, and above all, technical terminology, should be reduced to a minimum. Study and dissection of dead material should be omitted or passed over casually except perhaps for individual students who are particularly interested. The controversial and theoretical fields should be omitted. A wealth of practical and interesting material stands ready to occupy, indeed to overcrowd, the available time, especially if there is no separate course in health education.

For example, in the field of bacteriology, there should be some elementary consideration of size, behavior, and biological position of bacteria. Exposure and incubation of a few plates, if the equipment is available, may be profitable, but microscopic study should be limited to a few common large forms. Details of physiology, classification, evolutionary significance, cytology, technical names other than those in use in non-biological literature, chemistry of the sulphur and iron bacteria, and other difficult and specialized phases of the subject are best omitted. Pupils, as average citizens, are interested in the bacteria count of milk, how it is made and what it means, bacteria in food and water supplies, diseases caused by bacteria, sterilization of foods and utensils, beneficial bacteria, sewage disposal, refrigeration methods and industrial uses of bacteria. Visits to a water filtration plant, refrigeration plant, canning factory, clinical testing laboratory, or other establishments based in whole or in part on bacteriological principles, stimulate interest. Local con-

ditions determine which particular subjects should be emphasized and what illustrations made. If an occasional pupil is sufficiently interested to ask questions or to desire further study of the theoretical and technical phases of bacteriology, the teacher can discuss these with him individually, help him to find the literature and materials in which he is interested, and help him to devise a project to carry on, to whatever extent time and local facilities permit. The March, 1939, issue of *The American Biology Teacher* has an article concerning laboratory exercises for such a course.[3]

For a zoological illustration suppose the crayfish is under consideration. The pupils are interested in what the animal eats, where its mouth is, how it uses its legs to pick up food particles, how it locates it food, how it protects itself, what its feelers are used for, how the female carries its eggs and young, how the animal molts, what a "soft-shell" is, where the animal spends the winter, what its enemies are, what its practical uses are, how it is related to the fishes and fishing. Have a few live specimens in the classroom in an aquarium with clean glass sides. Let the pupils feed them, try to catch them, see how they react to the presence of other species of animals, note their responses to various types of stimuli, and occasionally just watch them. In talking about them forget all about scaphognathite, uropod, statoblast, epipodite, and maxillipeds. Front is as good as anterior, claw as cheliped, feeler as antenna. Anatomical details can safely be omitted; if there are a few specially interested pupils in the class, let them dissect either fresh or preserved specimens and demonstrate what they have accomplished. Taxonomy may be dispensed with almost entirely; a very brief consideration of the general zoological position of the crayfish, without technical names, is sufficient. Preserved specimens of a few closely related animals ought to be available for comparison.

In making up the high school biology course, all considerations of the college should be omitted. The college actually receives less than half of the high school graduates, and a much smaller percentage of those who finish the tenth grade, where biology is most commonly taught. Even for those who do go on, it is doubtful that after a two to four year lapse the experiences of high school biology would be of much assistance to a serious pursuit of the subject in college. The secondary schools have their own mission. High school biology should begin to mean something to the pupil long before he enters college, and even if he does not enter college at all. Especially if he does not enter college at all.

The shift in emphasis in high school biology has certain definite consequences in the relative importance of laboratory and field work. The aspects of biology which seem more worth while today do not fit quite so well to formal laboratory exercises. Often demonstrations or group observations must take the place of individual laboratory experiments. Many studies have been made to compare the relative value to the pupil of the demonstration method and the pupil participation method; most of these are not carefully controlled and are not measured by valid tests, however. They show very little difference between the methods in any case. The personality and ability of the teacher is a much more important factor.

[3] Hilliard, Curtis M., Suggestions for Laboratory Work in Bacteriology for High School Students, *Am. Biol. Teacher*, Vol. 1, No. 6, p. 134, 1939.

It is not my intention to imply that laboratory work is of no value and that we should abandon it. It merely does not loom quite so large as it did two or three decades ago. It should not be undertaken just for the sake of having a certain amount of laboratory work recorded in the school reports. (To be sure, legislative or administrative requirements must sometimes be fulfilled in this matter.) It should be used whenever, but only when, there is a need for it.

If this view gives to laboratory work a place of somewhat lesser importance, it gives to field and project work a correspondingly larger place. Many plants and animals can be observed much better in the field than in the laboratory. Field work has been neglected very largely because of three mistaken notions; first, that it is necessary for the teacher to know offhand all the plants and animals that are likely to be encountered; second, that there is nothing to see unless the trip is into a "wild" area some distance from town; and third, that every trip must be a special occasion, perhaps something in the nature of a picnic. The fact is that the teacher need not even know the family to which a plant or animal belongs; he can say "No, I don't know, I believe it belongs to the milkweed family; when we get back to school I'll help you find out." A city park or vacant lot may offer opportunity to see insects and their relation to plants, competition between plants, and soil animals. A field trip need not be more than a five minute inspection of a certain tree, fish pond, or feed lot. The real difficulty for most high school teachers is to find time in crowded schedules, but this can be surmounted to a large extent by a few short trips in the regular class periods and longer ones on Saturdays or after school hours. The latter should of course be on an entirely voluntary basis. Furthermore, by the use of the aquarium and terrarium, much of the interesting part of the field may be brought into the school building and most if not all of the benefits of field trips may be obtained without leaving the classroom.

Student projects are usually omitted or neglected because of lack of room and facilities, or excessive enrollment per teacher, or both. These are not just excuses but real difficulties. However, the clever teacher can think of some simple projects, such as collecting insects, wood samples, or weed seeds, making bird charts, mounting plants, building cages and the like, at least enough for the specially interested students. A certain amount of administrative cooperation is absolutely essential for success in this regard. Sometimes it becomes a part of the teacher's job to "sell" his methods to his administrators. A few teachers conduct their courses almost entirely on a project basis. They should be encouraged to tell about their experiences at teachers meetings and in the columns of *The American Biology Teacher* or other teachers magazines.

Modern biology must be adapted to the locality in which it is taught. In a Kansas high school the teacher who spends a laboratory period over dried or pickled starfish is probably wasting that much time. Not that the starfish is of no zoological importance, but its significance lies largely in the fields of taxonomy and evolution, which phases of biology would be pretty well left out of my high school course. A tree census can be made a very interesting project in almost any locality in the eastern states, but in some of the semi-desert areas in the west would be merely a matter of recording the three trees on the townsite. A fossil trip is a worthwhile adjunct to

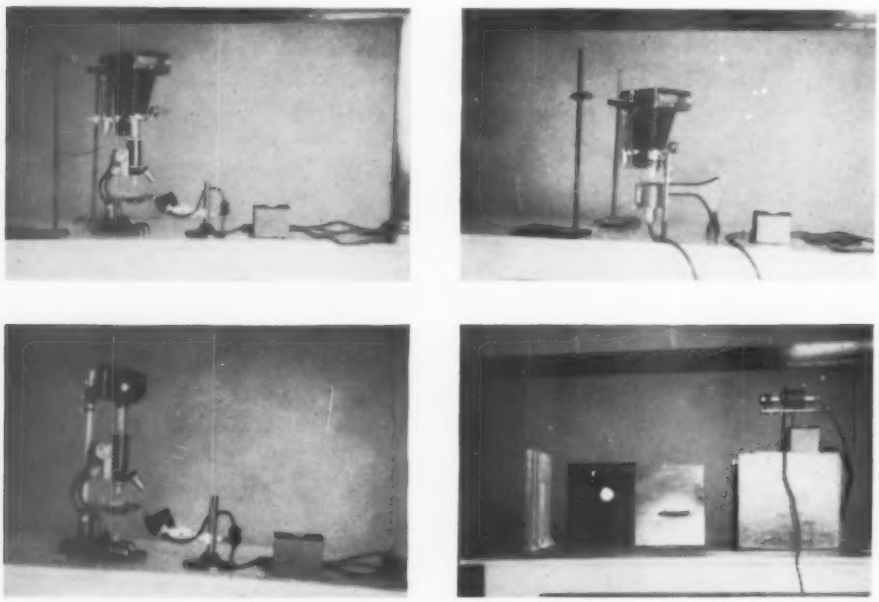
biology in one community and quite out of the question in another. It is manifestly impossible to devise a laboratory and field manual that can be followed blindly in any other community than the one in which it was written. It is up to the teacher to make the proper adjustments. Even under the most favorable circumstances no course can rise above the level determined by the scholarship, enthusiasm, sincerity and understanding of the teacher.

Photomicrography in Biology

S. EDMUND STODDARD
High School, Blackfoot, Idaho

A very basic activity of biology is the use of the microscope. By the application of this instrument a new world is explored by the student. After studying the more or less minute the student surely is interested in placing such observations on record. The taking of photomicrographs is an excellent procedure for making such recordings and likewise opens to the student the science of photography.

The present article presents four variations in the technique of photomicrography. These are illustrated in the Figure. Number 1 illustrates the taking of photomicrographs by use of a



Photograph showing four methods of taking photomicrographs. In Number 1 a standard camera is used. Number 2 illustrates the use of an amateur outfit. Number 3 demonstrates the use of a micro projector. Number 4 shows the method employed in making photomicrographs with positive paper.

standard camera having a ground glass on which to focus the image. The lenses of the camera are removed and the instrument supported by two ring stands. The image is brought to a sharp focus on the ground glass by adjustment of the microscope. The light source is a six volt bulb. A transformer is therefore needed to step-down the 110 volt alternating current.

Number 2 is the same as the first illustration except the camera is an amateur Bausch and Lomb photomicrographic outfit.

In Number 3 the same camera is used as explained in Number 1. However, the microscope is replaced by a micro projector. The projector uses a 6 volt bulb and transformer. This setup has been used very successfully by the writer. Four magnifications can easily be employed. There are two different powers of objectives furnished with the projector. These can be removed and the two objectives from a standard microscope used in their place. Even illumination is easily obtained and this ensures good pictures.

The setup in Number 4 has been devised by the writer for the purpose of taking photomicrographs on positive paper. This eliminates the negative but has the handicap of the necessity of an exposure for each picture. However, if only a few prints are desired it is of decided value. The project gives to the student opportunity for the study of a different process in photography. The micro projector is placed in the box. The front of this container is open but is constructed for the sliding in place of the two perforated metal squares. The first metal to be put in place is the one with the circular aperture. Through this opening the image is projected and brought to a focus on a paper held by the upright support. The second metal having the narrow slit is adjusted so that the lower third covers the circular opening of the first plate. The positive paper is put in place. The metal having the narrow slit is then dropped; the slit in moving across the circular opening gives the exposure. By varying the width of the slit the length of exposure can be varied. If a long exposure is necessary the image is projected through the circular opening for the required time. With this instrument pictures can be taken quickly and easily.

Why Study Biology?

JOHN EDWIN COE
Lake View High School, Chicago

The word Biology comes from the Greek "bios" meaning life. Today as never before, we are in search of the means of Better Living, of More Abundant Life. Biology, the science of life, should be able to point out the means of obtaining, both subjectively and objectively, these ends. It should give us the knowledge and the inclination toward activities which bring about happy and successful living.

The great basic needs of life are food, clothing and shelter; health, marriage and happy home and social life; an interesting occupation; and a satisfactory philosophy of life. Biology interprets

for us our environment, our relations to our surroundings, inanimate and animate. For instance, even in a favored nation such as ours where the economic philosophy is one of plenty, from twenty-five to seventy-five per cent of individual or family income is spent upon food, clothing and shelter. Here, biology explains the need for certain types of food, their composition and preparation, and how they meet these needs. The modern discovery and use of enzymes, vitamins and hormones are good examples of such applied biology.

Health should be considered from both its physical and mental aspects. Self-knowledge is of paramount importance to all of us. Biology considers the physical structure and the chemistry of the body; the muscles, blood, bones, nerves and sense organs. It recognizes bacteria as of enormous importance to health and outlines their characteristics and methods of control. It teachers us why we should not use a common drinking cup or eat with dirty hands; why we should sleep with our windows open; why we should protect ourselves by vaccination; why we should support the health officers during quarantine; why we should cover our mouths when we sneeze; how we should meet emergencies such as shock and how to apply artificial restoratives and stop bleeding from wounds. It leads us to appreciate the benefits of government regulation of foods, water, milk, drugs and cosmetics and of the proper disposal of street sweepings, garbage and sewage. It sees in insects man's greatest foe among the lower animals and explains the principles by which they can be controlled.

It considers the body functions, such as digestion, breathing, circulation, secretion, sensation and movement with the function and care of the organs concerned. During the past generation the average life-expectancy has increased about ten years. While this was due in part to medical discoveries, it has come about, in large measure, by a more widespread knowledge among our people of the requirements of health and sanitation. Biological knowledge is basic in the care of the child and of the sick.

The study of biology leads, also, to mental health. It enables us, as no other subject in the curriculum, to understand the philosophy of the universe. Biology is not agnostic. It merely states that science is experimental; that it is concerned with relationships of cause and effect under controlled conditions; that we know, at present, too little of the soul and spirit to be able to perform experiments under controlled conditions, in this field.

It frees us from the dominion of superstition; from such things as the carrying of rabbit's feet and buckeyes as charms; from the fear of baying hounds or of black cats; from fright caused by mice, spiders and snakes or lightning. Biology teaches us to avoid the self-application of patent medicines for which in the past we have expended over a billion dollars yearly.

The biologist awaits with interest the researches which will reveal the relation between the proteins and the genes and viruses, within which are bound up the great mysteries of life.

In the home, biology teaches us how to care for pets; how to grow plants and keep aquaria; activities which add so much to the pleasure of our lives.

There exists no lover of the outdoors, traveler, farmer, forester, hunter or fisherman, hiker or golfer, photographer or painter, who does not measure his enjoyment largely by the extent of his knowledge of the animals and plants with which he comes in contact. As a "Nation on Wheels," we should seek to get

as full a value as possible from the ten billion dollars which we spend annually on travel and sport.

Thru such nature hobbies as the keeping of vegetable, flower, water and rock gardens; the study of flowers, leaves, ferns, mushrooms and trees, of birds, insects, reptiles, fish and the lower invertebrates, we have a purpose in getting out into the open. Biology adds knowledge and interest to the pleasure with which we tramp thru forests and reserves. A hobby affords a very real opportunity to add to the sum of human knowledge. A great many of the early scientists, notably Mendel, Audubon and Thoreau, pursued their subjects as hobbies, making their living in other fields.

A little knowledge of nature will help us ascertain our place in the cosmos and show us how to remove the fears and phobias which lead to unrest and to feelings of depression, pessimism and inferiority. It helps us commune with Nature; forget the toil, bustle and anxiety of the city which at times becomes "too much with us." It enables us to renew our spirit so that we can again meet the exigencies of life with the requisite calm and composure. Donald Culrose Peatie recently wrote "A nature hobby is a shield against the slings and arrows of outrageous fortune, a form of saving for your old age. It is a possession no one can take from you, and one to which you can add indefinitely, for of understanding there are no limits."

Now that our population is no longer growing rapidly and the old frontiers for territorial expansion are closed, we must expect our national development to take place in new ways. The recent national surveys of our resources, forests, fuels, food and land use, minerals and water, plant, animal and human, have made us aware of the necessity of a wider dispensation of knowledge of conditions and opportunities in these great fields. Biology will hold an important place in these on coming social changes. We are just beginning to learn the implications of the great laws of inheritance. The discovery of hybrid corn has added one-fourth to the yield of this, the greatest of American crops. Two out of a hundred of our people are mental defectives. About half of these are due to the bacterial disease, syphilis, one that can be absolutely controlled when people awaken to the necessity; the other half are due to poor germplasm which, also, can be controlled by the application of the laws of eugenics.

We spend about one-fourth of our national income (some fifteen billion dollars) annually in the control of crime and criminals. Almost all of this comes from poor biological environment during youth. Eighty per cent of our criminals have never completed the eighth grade, due to poor home life, poor opportunities and ideals, poor leadership and bad companionship during youth, rather than to poor mental ability or disease. The abolition of slums, the provision of opportunities for work and guidance, education and health, can in the future reduce this loss of human effort and property to a vanishing point.

Our high divorce rate shows that much unnecessary mental suffering and the breaking up of homes could be avoided by a better knowledge on the part of young people of the great biological laws which are at the basis of eugenics.

About forty per cent of our population are farmers and their work in agronomy, horticulture and livestock breeding is largely applied biology. The future will undoubtly show many changes. Farming as an occupation has never paid. Even today the income of the farm family is less than half that

of the national average. The new science of water culture, "Hydroponics," may revolutionize much of agriculture and make the "desert bloom as the rose." Seashore, mountains, deserts and forests, due to cheap transportation, are rapidly becoming our homes for at least a part of the year. Our enjoyment of these depend in no small part upon our knowledge of biological facts and principles.

With the decrease in number of farmers and manufacturers due to technocracy or the use of machinery, there must come a great increase in the number of persons engaged in personnel service. At least one-third of our people do not receive satisfactory medical care. This, in spite of the 300,000 doctors, 100,000 dentists and the 600,000 nurses and other attendants of the sick. This want must be taken care of. The mounting number of old people cannot just be pensioned off. Ways must be found by which they can find employment suited to their age. This may well be in biological fields.

How important biology already is, can be demonstrated by the study of the catalog of one of our universities. The courses in agriculture, anatomy, botany, forestry, pharmacy, geology, horticulture, medicine, nursing, dentistry, physical culture, physiology, psychology, ethnology and zoology take up much of the catalog. In addition, chemistry and physics, history and sociology, physical and commercial geography are to a large extent applied biology. If we consider language and engineering as important controls of the environment; mathematics, the foundation of science; and law, the rules by which people live in society, we have encompassed the curriculum.

Our high schools, with nearly all our young people in attendance, are rapidly changing. In this lies the importance of the new movement in guidance. Industry can absorb only a limited number of those who are preparing in the business and technical courses. Personnel service in socio-biological fields, such as health, research, teaching, biological survey and entertainment must, therefore, occupy a much greater proportion of our people. Biological laws are basic, their applications underlying much of these social service fields, so their study must continue to grow in importance. Biology being as wide as Life, its applications are innumerable.

THE QUESTIONNAIRE

Members of N.A.B.T. who have not yet filled in and returned the *questionnaire* sent out early in December by the Committee on the Teaching of Biology are urged to do so soon and also to ask their colleagues to do likewise. If you did not receive this questionnaire notify Dr. D. F. Miller, Biology Building, Ohio State University, Columbus, Ohio.

A UNIT ON PSYCHOLOGY

Mr. Franklin R. Myers, Bernard High School, Bernardsville, New Jersey, would like to contact other biology teachers who have built up a unit on Psychology for inclusion in a tenth year biology course. Teachers interested in this field are asked to correspond direct with Mr. Myers.

Ed. Note: We are asking Mr. Myers to prepare for publication in THE AMERICAN BIOLOGY TEACHER a brief report on the results of his inquiry, if justified by the replies received.

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Second Annual Convention of the National Association of Biology Teachers

The second annual convention of The National Association of Biology Teachers was held in University School Building on the campus of The Ohio State University, Columbus, Ohio, on Friday, December 29, 1939, in connection with the one hundred fifth meeting of the American Association for the Advancement of Science.

One hundred and ten registered from fifteen states during the program. Sixty-five attended the banquet. President Malcolm D. Campbell presided at all of the meetings. President-elect George W. Jeffers acted as program chairman.

A well balanced program including papers on substantive biology, methods of teaching, and educational principles was presented. In the morning session the following papers were given:

1. Science Trends in the East and West. A. O. Baker, John Marshall High School, Cleveland, Ohio.

2. Gaining and Holding Student Interest. Gail H. Holliday, Wheeling High School, Wheeling, W. Va.

3. New Light on the Physical Basis of Heredity. Edward C. Jeffrey, Harvard University.

4. The Proposed Program of the Kansas Biology Teachers Association. Homer Stephens, Atchison High School, Atchison, Kansas.

5. Biology and the High School Science Sequences. Thomas Smyth, State Teachers College, Indiana, Pa.

In the afternoon session the following papers were given:

1. New Light on Barnacles. J. Paul Visscher, Western Reserve University.

2. The Preparation and Use of Botanical Materials for Biology Classes. Glenn W. Blaydes, The Ohio State University.

3. Biology Teaching and Conservation. Henry B. Ward, National Wildlife Federation and University of Illinois.

4. The Problem Approach to the Teaching of Biology. Howard H. Rostorfer, Knoxville, Tenn.

The dinner was held in the Medallion Room of Pomerene Hall. The speakers were Dr. William H. Weston, Professor of Cryptogamic Botany, Harvard University, who spoke on "Lower Plants and Higher Education" and Dr. E. G. Conklin, Professor Emeritus of Biology, Princeton University, who spoke on "Living vs. Dead Biology."

The address of Dr. Weston, as well as a number of the other papers, in whole or in part, are scheduled to appear in future issues of The American Biology Teacher.

The spirit in all the meetings was cordial and enthusiastic. Many new members were secured. In all respects the convention was a marked success.

The 1940 convention will be held in Philadelphia, during Christmas week, in connection with the meeting of the American Association for the Advancement of Science.

P. K. Houdek,
Secretary-Treasurer

NEW EDITOR ELECTED

The executive board of The National Association of Biology Teachers has accepted the resignation of Mr. I. Alex. Herskowitz, as acting editor of The American Biology Teacher, and has elected Dr. Edward C. Colin as editor.

Objective Methods in Teaching Biology

CHARLES W. GOUGET
Austin High School, Chicago

No one can miss the widespread interest and enthusiasm shown in a World's Series. Baseball occupies the headlines of daily papers, and becomes the chief subject of conversation on the street and in the classroom.

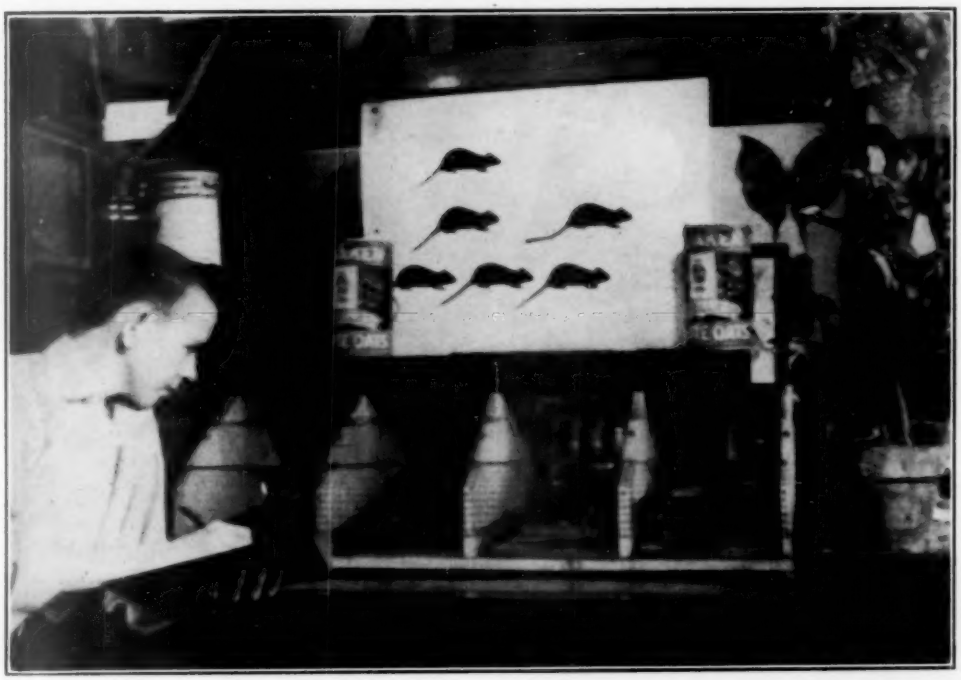
In the classroom the "shop" boy who is not bookminded, and who obtains little from the use of textbooks, becomes an authority on baseball among his more academic classmates. He knows the relative strength of the competing teams and the past performance of each outstanding player. To him each big league player has become a real personality because he himself has played baseball, he has talked baseball, and he has read about it in the daily papers. Hero worship based upon personal standards of appreciation and civic pride have produced an intrinsic interest in the subject, although he may never have seen a real big league game. Active interest has become functional enjoyment based upon a very elementary understanding of human behavior through personal experiences.

Most teachers will agree that baseball interest and enthusiasm are not present in the same degree when we study a problem in Biology or the biography of some great benefactor of humanity. In contrast the situation is too often a very artificial one lacking the momentum provided by proximity of experiences in the life of the student. Presentation through the more or less technical language of the printed page only helps to magnify abstractions with the net result that the whole lesson may be a mass of confused ideas with little or no relationship. The organization of any classroom procedure must consider this fact if interest is to be maintained. A great deal of time must be spent in building up an objective background to which more abstract ideas may be attached. We cannot expect young students to think successfully about things in which they have had few or no concrete experiences. Concrete experiences help the student to understand, apply, and recall what he has learned. It is therefore imperative that each part of a classroom procedure should contribute its share to some objective plan as a whole.

An Objective Approach

A successful approach to a subject may provide the "steam" that may carry a student through the term with interest and enthusiasm. A poor approach may "kill" interest to the point where it may never be regained. A successful approach, therefore, is usually psychological.

It is neither necessary nor always desirable to call every lesson a problem. Problems stated as such do not always produce problem solving attitudes on the part of students. In fact the very sense of mastery which is necessary for the solution of any problem is sometimes "killed" at the start among the more unsuccessful by the statement of the problem itself. Consequently the re-



Experiments Make Breeding and Feeding Objective

sponse is often negative and an attempt is made to avoid the situation at hand by transferring attention to something more objective. The object of attention may be a classmate or some of the live material around the classroom.

The very nature of avoidance mechanisms is an indication of the type of approach necessary among young students. An approach to a Biology lesson in high school should be a pleasurable experience involving personal standards of appreciation which have been built up by the teacher around concrete things through exploration and discovery. At this point the problem may be introduced incident to and not accidentally into the lesson. Proper appreciation will provide the momentum which will carry critical thinking to its logical conclusion.

Definite Assignments

Assignments for high school students should be short in order that attention may be focused on one phase of the work at a time. A short assignment is objective because the entire procedure is within the grasp of each individual at a glance, and it allows little latitude to "wander" from the prescribed task at hand. Short assignments can be dictated to the class by the teacher without any great loss of time, while the hearing, writing, and discussion that may be involved will help to make the procedure more objective.

The wealth of natural materials that may be built up in a laboratory by the functional co-operation of its students may surpass a teacher's wildest imagina-

A Chemical Garden Makes Plant Nutrition Objective

tion. Through judicious collecting and preserving over a period of years enough materials may be collected for individual student work. A supply of individual materials, where possible, is a very important factor in maintaining interest, focusing attention, and in providing the proper "atmosphere" for work in the high school laboratory. Groups may work more or less successfully on the same object, but no matter how small the group may be or how sincere their purpose there is nearly always an element of "play" that enters the picture which causes distraction and interferes with optimum results.

Objective Results

A high school Biology Laboratory usually reflects the type of teaching that goes on within it. It reflects evidence of organization and unity of purpose on the part of the teacher, and objective proof of interest and activity on the part of the students. Neatness, cleanliness and order usually imply organization in the classroom and respect among the students. The amount and kind of individual and group projects is a criterion of the amount of interest and the extent of activity among the classes. Projects are objective proof of work successfully completed.

The great difference between the response obtained from objective teaching in contrast with subjective teaching is much the same as a public response to a style show and a book review. Three hundred people may turn out to see a style show, while only fifty turn out to

hear a book review. The great difference in interest lies in the fact that most people are objective-minded.

Few students comprehend a long, involved printed page of directions. Most typewritten or mimeographed work sheets are objectionable from this standpoint. In addition work sheets usually cover such a wide range that young students are inclined to do all the easy work first, and honestly hypnotize themselves into believing that the rest of the work is finished. The size of the task is magnified by the size of the sheet and the psychological effect at the start may be to avoid the situation at hand, if possible.

Balanced Assignments

Our modern systems of mass education allow very little time for individual instruction during a supervised study period. As a result, assignments must be not only definite but also arranged in a way that will provide the maximum application by the student himself without the help of the teacher. To accomplish this end a teacher must make a wise choice of the "tools" of learning for each assignment. Each assignment must have movement to prevent fatigue and maintain interest. In addition it should be organized in such a way as to make use of repetition through the various channels of learning. Applicable notebook illustrations of actual specimens or materials provide an objective means of self-imposed application in large groups through which exploration and discovery may take place. Correlated references on the subject matter will help to enlarge and explain the original discoveries through repetition, and train in the exercise of judgment in the selection of important points to be recorded in the notebooks. Further, the training provided by the constant use of an index will provide a tool by which a student may carry his investigations to the extent of his interests. Well-planned group discussions may be used to bring all angles of the work to a focus, and help to point the way to the generalizations or conclusions involved as a result of the work covered in the classroom. In short, a balanced assignment will attempt to find an optimum relationship among the "tools" of drawing, reading, writing and discussion that will provide enough variety in activities to prevent fatigue and at the same time maintain interest and movement. It will also provide enough repetition through the different channels of learning to insure maximum learning with a minimum of teacher help.

Objective Notebooks

A notebook successfully completed represents an accurate record of work covered in the laboratory during some definite period during the term. It is a project carried to a logical conclusion by the student himself. He has done the whole job in which it has been necessary for him to exercise a great deal of self-imposed application. He has used certain skills which have helped to train his co-ordination; he has used judgment in the selection of his materials, and he has exercised initiative in the arrangement of his work to turn out a worth-while, finished product. The sacrifices made through the training involved make him justly proud of his accomplishment because his results are objective.

It is not likely that the same training nor the same psychological results are accomplished among high school students by the use of the so-called prepared "work-book." These books are often an expedient among teachers for a lack of definite procedure in the laboratory or as a substitute for the original source of

material which is Nature herself. "Work-books" enable a teacher to cover a large amount of work in a relatively short space of time by supplementing with partially completed outline drawings and completion sentences. Among high school students such a procedure becomes a "streamlined" method of getting through a lesson so that the next one may arrive as quickly as possible. It discourages adequate application and initiative and encourages slip-shod work through lazy method. In the end the work-book represents work that the student has covered by the aid of "props" and help of one kind and another. It is not a project in the real sense of the word and consequently not entirely objective to him. It is much better for a student to cover a few things well in a well-organized class procedure.

Objective Drawings

Since the time of the Cro-Magnon Man drawing has been used as a substitute for reality. It still remains as one of the chief methods of making man's thoughts objective. It furnishes the plan by which a giant skyscraper or a small home may be erected, and it furnishes the beautiful picture by which the meandering stream with its autumnal colorations may be brought into the most crowded parts of our large cities.

Under the proper direction and guidance of the teacher drawing is removed from the category of mere "busy work" and becomes a very valuable, even necessary, part of any high school procedure in Biology. Drawing makes a student actively interested in the material at hand and focuses his attention on an objective problem to be solved through accurate observation and analysis. When his attention tends to wander temporarily from the situation at hand he can always find it again because it is objective.

Objective Materials

The out of doors is Nature's Laboratory. It is the place where all real teaching takes place because there living things can be appreciated and interpreted in relation to their environment. Although a great deal of excellent teaching can be done by the use of parks and back lots in our large cities, the usual school organization makes it necessary that most of the teaching be done in the classroom.

The ideal Biology Laboratory, therefore, should be a substitute for the out of doors as nearly as possible; a place where a student may come into direct contact with an abundance of natural objects and their relationships. An interesting laboratory is dynamic. It stimulates students to take long walks in the city, and hikes to the country to collect and bring back specimens. It makes students "Biology conscious" when they are on trips with their parents or relatives. They are always on the alert for that unusual specimen that they may contribute to the classroom, or for that unusual phenomenon that was discussed in last week's lesson.

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Books

KINSEY, ALFRED C., *New Introduction to Biology*, 845 pp. J. B. Lippincott Co., Philadelphia, 1938. $1.32. (Evaluation by Textbook Reviewing Committee.)

Mechanical Make-up

This text is a reflection of a naturalist. The author shows this by placing the greater emphasis for visual supplementation of the printed word on the photograph taken from nature rather than the line cut or chart. A number of the units are introduced by an effective full page of natural color photography. The legends for the photographs do not, in all cases, explain fully the story the picture attempts to elaborate.

The text is made of a strong cloth binding with easily read type on a firm serviceable paper. The book is smaller in size than the average text. There are no footnotes, but summaries, definitions, and problems are found at the end of the chapters in a small legible type.

The text has a particularly effective preview page consisting of a bordered panel of silhouettes. It makes for a doubly motivated reading of the preview to the units. The cost of *New Introduction to Biology* is comparatively low.

Psychological Soundness

"*New Introduction To Biology*" is a ninth year text in elementary biology, consisting of seven units. The several chapters included under each unit are presented in an interesting manner. The material is adapted to the age of the average ninth year pupil. With the exception of a chapter or two in the unit on Taxonomy, all chapters are of equal difficulty.

Four of the seven units are introduced with page-long "Previews" which present stimulating questions whose answers are found in the text. A few chapters are also introduced with several questions. This is the nearest approach the text makes to presenting its material in problem form.

There are on the average eighteen problems—questions found at the end of each chapter. In all there are about eight hundred of them. Direct answers to the greatest number of these questions cannot be found in the text. This is an admirable feature and may well be used to provide for individual differences existing among pupils of most classes.

Dr. Kinsey's textbook omits experiments in osmosis, respiration or photosynthesis. More use might have been made of the inductive and problematic approach so essential to science teaching. The quality of the problem-questions may also be improved.

It is felt that one of the original aims of the author, that is, to interest the student in the out-of-doors, is effectively consummated.

Literary Style

Dr. A. C. Kinsey's wide experience as a teacher, scientist and field worker has given him a fine background for writing a biology text with a style well adapted to reach high school boys and girls in an interesting way. His introduction to the study of biology about the snakes he kept below ground through a cold Maine winter, to find them alive and healthy the following spring, will certainly draw interest and curiosity. Many everyday explanations are used to make some difficult subjects more understandable. For instance in discussing heredity and environment, he says, "Without an opportunity to use it, one's heredity is worth little. The inheritance of muscles and control is not enough to make a swimmer. An ocean, lake, swimming pool, or other suitable environment must also be provided." And again, in the chapter on behavior, "A tropistic response to a candle flame is of no advantage to the species to which the moth belongs. But to have resisted the light stimulus would

have been more difficult for the moth than it would be for a hungry man to suppress his interest in a fine display of food set before him." Such allusions and explanations we know bring the technical considerations concretely to the student's mind.

Clearness and accuracy of statement has been attempted with success. Occasionally the unit headings seem to be a little remote, reminiscent of our college texts. Such titles as "Naming and Classifying Plants and Animals"; "Functions among Plants and Animals," do not draw one on to the fascinating fields of study which Dr. Kinsey subsequently unfolds.

The same might be said I think with justice of chapter headings such as "Geographic Distribution of Organisms"; "Reproduction"; "Embryology"; "Reflexes and Tropisms." Indeed the reader is unprepared for the pleasant surprise which is to follow. He finds a crisp, flowing style abundantly illuminated with stories, experiences, and illustrations bringing all into the range of the student's apperception.

Learning Exercises and Teacher's Helps

New Introductions to Biology is not a type of textbook that attempts to stimulate learning with the use of demonstrations and experiments. It has few demonstrations, experiments and laboratory exercises, although a Workbook is available. The author substitutes for this apparent deficiency with a highly motivating style.

The photographs and illustrations are unusually numerous and realistic, making each unit interesting. Various line drawings, distribution maps and charts of Unit II (Distributional Biology) are particularly good, especially in chapters "Life Zones" and "Geographic Distribution of Organisms."

The book offers numerous teacher aids. At the end of each chapter there is a summary and a list of questions on the work covered. All the definitions used in the chapter are listed. Included are extensive reference lists given after each of the seven sub-divisions of the text. In addition, for the student interested in other sciences the author has an appended reference list.

Methods in Biology by the same author takes the place of a separate teacher's manual and includes extensive treatment of the content with teaching devices. A field and laboratory program designed to accompany the text is also available in *Workbook in Biology* published by J. B. Lippincott Co.

Subject Matter

For the benefit of those who are not acquainted with the author's background, it should be stated that the text is the outgrowth of a boyhood interest in the out-of-doors, as well as many years of camping experience. The author's objective is giving the boy and girl of today a survey of the living world; of presenting to them the unity of life processes in plants as well as animals, and giving them some grasp of the general principles represented in every day forms of life. This is an ambitious one and he presents the subject matter in detail, and effectively reaches the desired goal. He makes the book socially useful to the pupil.

The subject matter is presented in seven units, each of which is introduced by means of a "preview." The titles are as follows:

I. Naming and Classifying Plants and Animals
II. Distributional Biology
III. Form and Structure
IV. Functions among Plants and Animals
V. Similarities and Differences among Plants and Animals
VI. Relations of Plants and Animals to Their Environment
VII. How Plants and Animals Behave

The units are followed by a conclusion

consisting of the historical aspects of biology. The present edition differs from previous issues. Unit I has been revised to provide a simpler approach and to enhance the beginner's interest. The principle of conservation is particularly stressed under Unit VI. The large fund of biological subject matter included between the covers of this text may appear to be voluminous, but the modern secondary school teacher will find a rich supply of useful educational material from which to draw for students the experiences of an enthusiastic fellow biologist.

ALAN A. NATHANS
ABRAHAM LIEBERMAN
VICTOR LEWITUS
FRANKLIN B. MYERS
ETHEL POSTER.

HINMAN, R. B., AND HARRIS, R. B., *"The Story of Meat,"* Swift and Company, Chicago, Illinois. 1939. $1.00.

A unique vocational textbook combining a range of academic subjects—history, geography, economics, biology, and nutrition—with instruction in a trade hitherto scarcely considered by educators is the recently published 250-page "The Story of Meat" by Robert B. Hinman, professor of animal husbandry at Cornell University, and Robert B. Harris, teacher at the New York City Food Trades Vocational High School.

Written originally for students in New York City's Food Trades Vocational High School who intend to become meat retailers, it is a textbook that blazes a nutrition—with instruction in a trade trail in a brand-new field, and indicates an interesting and important trend in today's vocational education. A far cry from the cut-and-dried handbooks of the old-fashioned trade school, "The Story of Meat" is a spirited, readable, and well-rounded presentation of a major industry, its vast and colorful history, its complex present-day operation and significance and its economics. The book, attractively and profusely illustrated, has been designed to present this complex and sometimes technical story in terms interesting and comprehensible to high-school age students.

Beyond its intrinsic interest as the first textbook in its field, and as an important contribution to vocational education, the book represents a new and interesting type of collaboration between education and industry.

A limited number of copies are available free to selected schools offering vocational subjects allied with the meat industry.

B. BERNARR VANCE,
Associate Editor

Biological Briefs

RUTH SHERMAN

HODGE, HENRICKS. *The Nightshade Family: The Dr. Jekyll and Mr. Hyde of the Plant World.* Natural History 44: 160–167. October, 1939.

For an ancient background of superstition and reputed panaceas, as well as for a list of modern uses as foods and powerful drugs, we may look to the nightshade family in its old- and new-world forms. In the Middle Ages, the mandrake was associated with fearsome legends, and was considered a precious cure-all. From its close relatives, the alkaloids atropine and belladonna in minute amounts are yet used as drugs. The European black henbane, introduced along the southern banks of the St. Lawrence River, is extremely poisonous; from it the drug hyoscamine is obtained. The species of Datura, common in both hemispheres, include many highly poi-

sonous types, and the alkaloids are especially concentrated in the seeds. The more famous nightshades, American in origin, are the white potato (Aztec, not Irish, in origin), red pepper, tomato, and tobacco. Among cultivated garden flowers, the most common are Cestrum, Salpiglossis, and Petunia.

ABBOTT, CLINTON G. *Sea-Lion Slaughter.* Bird-Lore 41: 264–270. September–October, 1939.

Fishermen have for years warred on the sea-lions of the Pacific coast, claiming inroads on fish and damage to nets for their justification. Likewise, the animals have been slaughtered for certain organs prized by the Chinese for their supposed medicinal value. Recently, however, a concerted attack has been made on the animals in Mexican waters for conversion into American-canned dog and cat food. They are also killed at times for their hides, which have little or no commercial value. There is at present a danger that the existing California law protecting sea-lions will be changed so that the animals, none too plentiful at present, may be killed on our coasts as well.

DUNSHEE, WINFIELD B. *Blister Rust Threatens the Sugar Pines.* American Forests 45: 492–495, 525–526. October, 1939.

The white-pine blister rust, apparently originating in Asia, having spread over Europe, has reached America and is now endangering our most majestic pines. It was introduced in the east several times when, at the beginning of the century, importations were made of European white pine seedlings for reforestation. The disease has since been spreading through the native white pines, although it is now under partial control. It has more recently been discovered on the Pacific coast, having apparently been introduced at Vancouver from France. It is entrenched in British Columbia and the state of Washington, and has spread into Oregon, northern Idaho, and northern California. Here it is attacking all species of white pines, but particularly the huge and valuable sugar pine. The fungus attacks the bark, girdling the branches and killing the tree. Spores from an infected tree may be wind-borne for 150 miles or more to the alternate host, wild currant and gooseberry bushes, known as ribes. The rust passes through the second phase of its life on the leaves of these plants, and the resultant spores are carried back to pines by the wind; these spores are so delicate, however, that they are not viable beyond a radius of 900 feet. Control measures, based on this fact, consist mainly of eradicating all ribes from white pine areas where the rust exists or is threatening to appear. The work is being accomplished mainly through CCC labor.

HAUSMAN, LEON A. *Furs under the Microscope.* Nature Magazine 32: 501–503. November, 1939.

In this article we find an approach to the study of animal pelage. The cuticle scales on the hairs of mammals, as well as the amount and distribution of the medulla or pith in the shaft, exhibit constant differences among the furbearers. The author rates a number of furs according to their durability, basing this inversely upon the amount of loose medulla in the hair shaft. Detailed instructions for making microscopic mounts are not given, but there are some suggestions as to modes of study.

COLBERT, EDWIN H. *Wild Dogs and Tame—Past and Present.* Natural History 43: 90–101. February, 1939.

The paleontological history of the dog

family, together with theories as to the development of intelligence and habits, is concisely presented and well illustrated with drawings of the forms described. Appended is a series of illustrations of one hundred modern canine breeds. This is excellent material for classroom use.

DARLING, F. FRASER. *I Lived with Seals.* Discovery n. s. 2: 112–120. March, 1939.

The article describes the breeding and social behavior of the British grey seal as observed on the tiny rock-bound islet of Rona, in the North Atlantic. The seals must climb extremely high and difficult cliffs in order to reach the crowded breeding grounds. In August, the bulls appear and establish individual territories; soon afterwards the cows arrive, and pups resulting from the previous year's matings are born thereafter. For a period of from two weeks to a month, the mothers fast while suckling the pups. When the latter are weaned, they too must starve until they can make their way down the cliffs to the sea, and this trip sometimes takes almost a month. The bulls and cows leave the island in November and spend some time at the resting shoals before returning to the sea.

SOME TEACHING AIDS FOR BIOLOGY

H. W. HOOPER
Wewoka High School, Wewoka, Oklahoma

Boys and girls are my business and teaching is my profession. Educators and psychologists have taught us that boys and girls gain knowledge through their many senses. The senses, of course, are external representatives of the central nervous system. Whenever the nerves are stimulated, there is a response, either immediate or remote, depending upon the kind of stimulus. In my teaching of the many boys and girls with their varying capacities for being stimulated and abilities for responding, I try to present to them a field of activities as wide as possible. These activities in biology are: Reading, discussion, drawing, experiments, demonstrations, projects, field trips, etc. Methods and materials used in presenting subject matter to the students come under the heading of teaching aids.

We have built up during the past ten years a large collection of animal and plant demonstration materials. These are properly labeled and arranged so that they may be displayed readily. The students observe them and make note of the points which illustrate the subject of the lesson. The same material may be shown several times during the year to demonstrate different ideas. I believe that if a specimen is worth being shown it is worth making note of.

At the beginning of the year each student assembles material for constructing an aquarium. Wide mouth gallon jars with plate glass tops are used. Excursions to ponds, lakes, and streams provide sufficient water plants and innumerable vertebrate and invertebrate forms. During the year the students are confronted with many problems of aquarium care. By observation and reading of selected material, they can solve many of their problems, and in the meantime learn much about the lives of fresh water forms.

My students say they can understand a subject better if I illustrate it by making drawings before them on the board. These drawings are usually made with ordinary crayon, but occasionally colored crayons are used. By executing the illustration before them, the relation-

WHY ABSTRACTS?

A good abstract:

"(1) enables the reader to determine whether or not a paper is of sufficient interest to him to warrant his reading it;

(2) it enables the teacher and general reader to keep themselves informed on the trend of current biological investigations with a minimum of effort; and

(3) it enables any reader to peruse the article more intelligently than he could otherwise."

(Smith, R. C., Jour. Ec. Ent. 31 (5): 564. N 11, 1938.)

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ship of parts can be more easily shown. Whenever I am crowded for time, I exhibit prepared charts and diagrams. Some of these we have purchased, and others have been made by outstanding students in previous years.

For our opaque projector (which is home-made) we have assembled a large collection of pictures which we have pasted on gray cardboard. The gray cardboard cuts down the reflection of light. These pictures are projected onto a translucent screen, where the students look at them from the front side. Instead of being projected, these pictures may be passed among the students. In this way they serve a double purpose. There is a never ending source of supply of interesting biological pictures in magazines and old biological supply catalogues.

DEMONSTRATION OF CIRCULATION IN THE LIVING GOLDFISH

The visual demonstration of the circulation of the blood in living vertebrates has long been a classic in biology laboratories. The web of the frog's foot is perhaps most often used. The tail fin of the common goldfish, however, offers many advantages over that of the frog's foot. The steps in the demonstration are as follows:

1. Place a small goldfish, about two inches in body length, in a dilute solution of chloretone, *i.e.*, from one to two teaspoons full of saturated solution to four ounces of water. (Chloretone is a derivative of chloroform and is slightly soluble in water. It can be purchased

in crystalline form at the supply houses and at some drug stores). After only a few minutes in the chloretone the fish slows down and begins to turn on its side.

2. Before its activity ceases remove the fish from the solution and place it on a clean glass plate wet with water. A lantern slide cover or piece of window glass about the size of the microscope stage will do. Lay over the fish a layer of absorbent cotton dripping from clear water. Place the cotton so that it covers the fish except for the posterior half of the tail fin. The fin spreads out easily and tends to stay spread. The weight of the wet cotton tends to prevent the fish from flipping the fin up against the objective if it begins to revive.

3. Under the low power (100 x) arteries, veins, and connecting capillaries can be identified readily by the students. This identification is much easier than in the frog's foot since the larger vessels run parallel to the fin rays. Closer inspection usually reveals the lymph vessels, containing white corpuscles and a few red ones. The rate of movement of the corpuscles in the lymph vessels is noticeably slower than in the blood vessels. The fin should be kept wet at all times in order to obtain the best results.

4. Add a cover glass and turn on the high power (430 x). The outlines of the lymph vessels and capillaries become very clear. Striking differences in the red and white corpuscles are now apparent. Nuclei of the ordinary tissue cells also are easily seen, as are of course pigment cells.

5. Upon its return to the aquarium after one hour or even two hours under the microscope the fish ordinarily swims off at once. If it should show no signs of life a brief period of artificial respiration administered by holding it in the fingers and rapidly pushing it through the water with its head first and mouth open usually revives it. Scarcely ever does a fish fail to revive.

This demonstration is so easy to do, requires so little time in preparation, and is so interesting and instructive to students of all ages that it deserves to be more widely known and used than it appears to be.

E. C. C.

SOUTHERN CALIFORNIA ASSOCIATION OF LIFE SCIENCE TEACHERS

The Southern California Association of Life Science Teachers held its December meeting at Porter Hall, University of Southern California, Los Angeles, on December 7th.

Election of officers took place. The following officers were elected:

President: Mr. Charles C. Herbst, Beverly Hills High School.

Vice President: Miss Archie MacLean, Huntington Park High School.

Recording Secretary: Miss Louise Mohn, Fremont High School.

Corresponding Secretary: Mrs. Dorothy Pool, North Hollywood High School.

Treasurer: Mr. Robert Armacost, Santa Monica Junior College.

Following the business meeting, Dr. H. Boorsook, Professor of Biology, California Institute of Technology, Pasadena, California, gave a most interesting and educational lecture on vitamins. Dr. Boorsook has done much experimental work with Pasadena children and adults which has resulted in new knowledge concerning Vitamin B.

Dorothy A. Pool

BIOLOGY TEACHER'S ASSOCIATION FORMED IN SOUTH DAKOTA

We have formed what we believe will

be an active and distinctly beneficial biology teacher's association here in the southeastern section of South Dakota. While this association is still in its infancy, several meetings have been held and plans have been completed for another meeting in February.

The idea to form our association originated at our last science round table meeting in connection with the South Dakota Educational Association district convention. At this meeting, H. E. Thurston, Washington High School, Sioux Falls, gave a talk on "The Possibilities of a Biology Association." Considerable interest was aroused and he was elected temporary chairman in charge of the first organization meeting.

The first meeting was held in Sioux Falls, Saturday, December 2nd. Ten schools in all were represented. Of this number, five were colleges and five were high schools. The morning was spent in making a tour of the Morrell Packing Plant, one of the largest industrial plants in this section of the country. In the afternoon a paper on "Endocrine Glands" was presented by W. D. Duncan, of Sioux Falls. In his talk he discussed the location, secretions, proper functioning, and value of the endocrine glands to the human body. Another interesting part of the talk consisted of the naming of commercial endocrine products that are on the market and their real value. A business meeting was held at the close of the afternoon session at which time the organization of our association was completed.

Several rather unusual practices were followed in organizing our association. First of all we decided to elect a new chairman and choose a new meeting place for each successive meeting. It is felt that the different towns that we meet in will each have bureaus and institutions that we can become better acquainted with. The bureaus and institutions that we will visit will all be closely associated with our biological studies. The new chairman that is elected for each meeting will be selected from the town where the meeting is to be held. The advantage of this is in the familiarity of the local chairman with the opportunities offered by each particular community. H. I. Maggrett, Washington High School, Sioux Falls, was elected secretary so that all association correspondence during the year could be sent to one address.

The next meeting will be held in Vermillion in February with Dr. H. C. Eyster, head of the botany department at the University of South Dakota, in charge of the meeting.

H. I. Maggrett

THE 1940 CHICAGO BIOLOGY ROUND TABLE PROGRAM

The *Chicago Biology Round Table* supplemented its regular January 12 meeting with a memorial to the late Dr. Henry Chandler Cowles, professor of botany of The University of Chicago. This was led by Dr. E. E. Sherff, of Chicago Teachers College, who spoke on "Dr. Cowles as a Man." Dr. Helen Dixon, of Tuley High School, spoke on "Dr. Cowles as a Teacher and Leader." Miss Genevieve Monsch, of Morgan Park High School, presented a bronze plaque to Dr. George D. Fuller, as representative of the Botany Department of The University of Chicago, in memory of Dr. Cowles.

Dr. Paul Voth of the Botany Department of The University of Chicago, lectured to the group on his experiences at the Station for Biological Research, Barro Colorado Island, Canal Zone. His lecture was illustrated with stereopticon slides, tables, and charts.

The February 16 meeting will be devoted to a lecture by Frank Kirby,

Educational Director of Abbott Laboratories of North Chicago. The title of his lecture will be "Catching Vitamins on Fishhooks." He will present the latest developments in the study and application of vitamins.

The March 8 meeting will be in charge of our own members. Miss Bessie Bell, of Morgan Park High School, and Miss Ruth Conner, of Englewood High School, will submit a report of a survey of the present status of biology in Chicago high schools. Mr. I. P. Daniel will lead a panel discussion on "What Should be the Content of the Biology Course in Chicago?"

In May a field trip will be taken into the dunes area. The leader will be Dr. O. D. Frank, of The University of Chicago.

The June meeting will be the regular annual business meeting.

M. C. LICHTENWALTER

ELECTION NOTICE

The following nominations have been made for the offices of The National Association of Biology Teachers by the Election Committee, Mr. M. C. Lichtenwalter, Chairman. An official ballot will be mailed to you on February the fourteenth.

For President-elect

Willis W. Collins, Idabel, Oklahoma

Homer A. Stephens, Atchison, Kansas

For First Vice-President

Edith Kraest, Los Angeles, California

Helen Trowbridge, Glen Ellyn, Illinois

For Second Vice-President

Robert L. Black, Indianapolis, Indiana

M. A. Russell, Highland Park, Michigan.

For Secretary-Treasurer

P. K. Houdek, Robinson, Illinois

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CANDIDATES FOR 1941

The following biographical sketches of the candidates for 1941 have been prepared by Mr. Lichtenwalter.

Mr. Willis W. Collins, candidate for president-elect, divides his time between biology and other sciences in the Idabel High School, Idabel, Oklahoma. He has eight years teaching experience in public school systems. He is a graduate of Oklahoma A. and M. College and has done graduate work toward a doctorate at the University of Minnesota. He is interested in biology club work and operates a student exchange of materials with other clubs. He is an associate editor of THE AMERICAN BIOLOGY TEACHER.

Mr. Homer A. Stephens, candidate for president-elect, is an instructor in biology at Ingalls Junior-Senior High School, Atchison, Kansas. He is a graduate of Emporia Teachers College and has an M.A. degree in biological science teaching from Teachers College, Columbia University. He was instrumental in the organization of the Kansas Association of Biology Teachers and is a member of the executive, text book, and course of study committees. He has presented papers before the Kansas Association, The National Association of Biology Teachers (in 1939 at Columbus, Ohio), The Kansas Academy of Science, and The Kansas Junior Academy of Science.

Miss Edith Kraest, candidate for first vice-president, is connected with the Los Angeles public schools as coordinator of life science teaching for the University of Southern California and the Los Angeles public schools. Her university training, taken at the University of Chicago, includes an M.A. degree. She is immediate past president of the Southern California Association of Life Science Teachers and was one of the leaders in the organization of this group.

Miss Helen Trowbridge, candidate for first vice-president, is biology instructor at Glenbard High School, Glen Ellyn, Illinois. She has an M.A. degree from the University of Michigan in zoology. She is a member of the Illinois Biology Teachers Association, Illinois Curriculum Study Committee, and Chicago Biology Round Table. She is an associate editor of THE AMERICAN BIOLOGY TEACHER, and has published articles in the journal on "The Advantages of the Microprojector in the Classroom"; "The Vivarium"; and "Culturing Invertebrates." She was on the program of The High School Conference at the University of Illinois, summer, 1938.

Mr. Robert L. Black, candidate for second vice-president, is instructor in biology at the Emmerich Manual Training High School, Indianapolis, Indiana. He is a graduate of Amherst College with a B.S. in animal husbandry from Iowa State and M.S. in zoology from the University of Michigan. He is a member of several educational and professional societies and served on several committees. He collaborated with Dr. F. C. Gates on an article, "The Dragogle as an Ecological Instrument" published in the journal, *Ecology*. He has another article accepted by the *Scientific Monthly* but not yet published.

Mr. M. A. Russell, Highland Park, Michigan, candidate for second vice-president, has been a biology teacher for twenty-two years in high school and junior college at Highland Park, Michigan. He is a graduate of Michigan State College and holds an M.A. degree from the University of Detroit. He was president of the Detroit Biology Club from 1937 to 1939, and is chairman of the science section of the Michigan Schoolmasters Club. He is an associate editor of THE AMERICAN BIOLOGY TEACHER.

Mr. P. K. Houdek, candidate for secretary-treasurer, is a teacher of biology and chemistry in the Robinson Township High School, Robinson, Illinois. He has been in his present position for thirteen years. He is a graduate of Knox College and has an M.A. degree from The University of Chicago. He is chairman of the publication committee of the Illinois Biology Teachers Association and was its president from 1931 to 1936. He is a charter member of the N.A.B.T. and its present secretary-treasurer.

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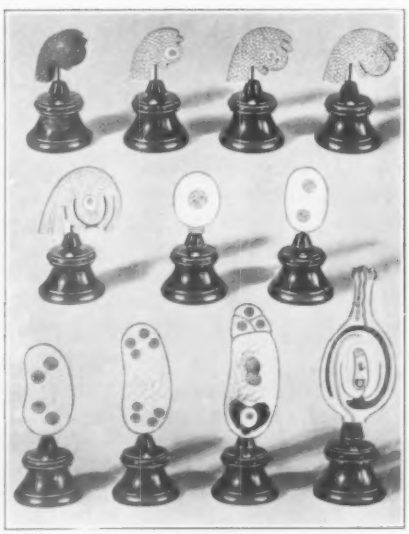

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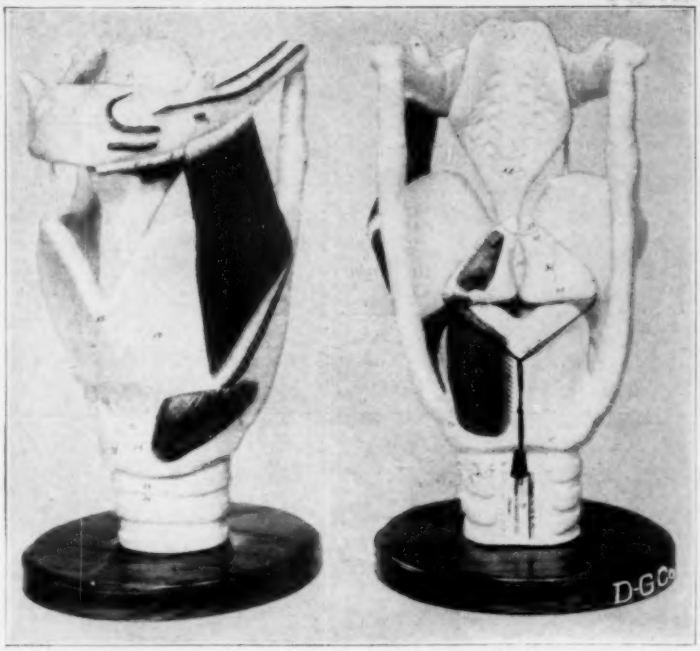

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